WHAT IS CLAIMED IS:

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1. A lens system comprising;

a plurality of lenses, a stop, and a diffractive surface,

said lens system moving the whole or part of the lens system during focusing and satisfying the following condition:

$\beta \geq 0.5$,

where β is a maximum photographic magnification.

2. The lens system according to Claim 1, wherein part of the lens system moves during focusing, and said a plurality of lenses is arranged symmetric or substantially symmetric with respect to said stop.

3. The lens system according to Claim 1, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +\ldots + Ci*h2i),$$

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

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4. The lens system according to Claim 1, which satisfies the following condition:

$|\Delta S/f| > 1.0$,

where ΔS is a maximum moving distance of the whole of said lens system during focusing from an object at infinity to an object at a near distance, and f a focal length of the entire lens system.

5. A lens system comprising;

a diffractive surface, and

a first lens unit of a positive refracting power, a stop, and a second lens unit of a positive refracting power in the order (named) from the object side,

said lens system moves the whole of the lens system during focusing and changes air spaces before and after said stop during focusing.

6. The lens system according to Claim 5, which satisfies the following condition:

$0.7 < |\Delta s1/\Delta s2| < 1.3$,

where $\Delta s1$ is a moving distance of said first lens unit during focusing and $\Delta s2$ a moving distance of said second lens unit during focusing.

7. The lens system according to Claim 5, which satisfies the following conditions:

$0.7 < f1/f < 1.3$, and

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$1.5 < f2/f < 2.5$,

where f1 is a focal length of said first lens unit, f2 a focal length of said second lens unit, and f a focal length of the entire lens system.

8. The lens system according to Claim 5, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +... + Ci*h2i)$,

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

9. The lens system according to Claim 5, which satisfies the following condition:

$|\Delta s1/f| > 1.0$,

where $\Delta s1$ is a maximum moving length of said first lens unit during focusing from an object at infinity to an object at a near distance, and f a focal length of the entire lens system.

10. A lens system comprising;

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a diffractive surface, and

a first lens unit of a positive refracting power, a second lens unit of a positive refracting power, and a lens unit of a negative refracting power closest to an image, in the order (named) from the object side,

wherein during focusing from an object at infinity to an object at a near distance said first lens unit and said second lens unit move toward the object side and an air space increases on the said object side from said lens unit of the negative refracting power.

11. The lens system according to Claim 10, which satisfies the following condition:

$0.7 < |\Delta s1/\Delta s2| < 1.3$,

where $\Delta s1$ is a moving distance of said first lens unit during focusing and $\Delta s2$ a moving distance of said second lens unit during focusing.

12. The lens system according to Claim 10, which satisfies the following conditions:

$0.6 < f1/f < 1.1$,

$1.5 < f2/f < 3.5$, and

$-6.0 < fR/f < -2.0$,

where f1 is a focal length of said first lens unit, f2 a focal length of said second lens unit, fR a focal length of said lens unit of the negative refracting power, and f a focal length of the entire

lens system.

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13. The lens system according to Claim 10, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 + ... + Ci*h2i),$$

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

14. The lens system according to Claim 10, wherein said first lens unit or second lens unit comprises a diffractive surface.

15. The lens system according to Claim 10, wherein said first lens unit and second lens unit comprise their respective, diffractive surfaces.

16. The lens system according to Claim 10, wherein said lens unit of the negative refracting power is fixed during the focusing.

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17. The lens system according to Claim 10, which satisfies the following condition:

$|\Delta s1/f| > 1.0$,

where $\Delta s1$ is a moving distance of the first lens unit during said focusing and f a focal length of the entire lens system.

18. A lens system comprising;

a diffractive surface, and

a first lens unit of a positive refracting power and a second lens unit of a negative refracting power in the order (named) from the object side,

wherein during focusing from an object at infinity to an object at a near distance, said first lens unit moves toward said object side and a spacing increases between said first lens unit and said second lens unit.

19. The lens system according to Claim 18, which satisfies the following conditions:

$0.5 < f1/f < 1.1$, and

$-2.5 < f2/f < -1.5$,

where f1 is a focal length of said first lens unit, f2 a focal length of said second lens unit, and f a focal length of the entire lens system.

20. The lens system according to Claim 18, wherein said first lens unit comprises a diffractive

surface.

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21. The lens system according to Claim 18, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +... + Ci*h2i),$$

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

22. The lens system according to Claim 18, wherein said second lens unit is fixed during the focusing.

23. A lens system comprising;

a diffractive surface, and

a first lens unit of a positive refracting power and a second lens unit of a positive refracting power in the order (named) from the object side,

wherein during focusing from an object at infinity to an object at a near distance, said first lens unit moves toward the object side.

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24. The lens system according to Claim 23, which satisfies the following conditions:

$0.7 < f1/f < 1.3$, and

$f2/f > 10$,

where f1 is a focal length of said first lens unit, f2 a focal length of said second lens unit, and f a focal length of the entire lens system.

25. The lens system according to Claim 23, wherein said first lens unit comprises said diffractive surface.

26. The lens system according to Claim 23, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +... + Ci*h2i)$,

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

27. The lens system according to Claim 23, wherein said second lens unit is fixed during the

focusing.

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28. A lens system comprising;

a diffractive surface, and

a first lens unit of a positive refracting power, a second lens unit of a negative refracting power, and a third lens unit of a positive refracting power in the order (named) from the object side,

wherein during focusing from an object at infinity to an object at a near distance, said first lens unit is fixed, said second lens unit moves toward an image side, and said third lens unit moves toward the object side.

29. The lens system according to Claim 28, which satisfies the following condition:

$0.50 < \Delta s2/|\Delta s3| < 1.50$,

where $\Delta s2$ is a moving distance of said second lens unit during the focusing and $\Delta s3$ a moving distance of said third lens unit during the focusing.

30. The lens system according to Claim 28, which satisfies the following conditions:

$0.40 < f1/f < 0.65$,

$-0.50 < f2/f < -0.25$, and

$0.40 < f3/f < 1.10$,

where f1 is a focal length of said first lens

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unit, f2 a focal length of said second lens unit, f3 a focal length of said third lens unit, and f a focal length of the entire lens system.

31. The lens system according to Claim 28, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +... + Ci*h2i)$,

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

32. The lens system according to Claim 28, wherein said first lens unit comprises a positive lens closest to the object.

33. The lens system according to Claim 28, wherein a stop is placed between said second lens unit and said third lens unit and said stop is fixed during the focusing.

34. The lens system according to Claim 28, which

comprises a flare cut stop in the optical path.

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35. The lens system according to Claim 28, wherein said second lens unit and said third lens unit both comprise their respective cemented lenses.

36. A lens system comprising;

a diffractive surface, and

a first lens unit of a positive refracting power, a second lens unit of a negative refracting power, a third lens unit of a positive refracting power, and a fourth lens unit of a negative refracting power in the order (named) from the object side,

wherein during focusing from an object at infinity to an object at a near distance, the first lens unit is fixed, said second lens unit moves toward an image side, and said third lens unit moves toward the object side.

37. The lens system according to Claim 36, which satisfies the following condition:

$0.50 < \Delta s2/|\Delta s3| < 1.50$,

where $\Delta s2$ is a moving distance of said second lens unit during the focusing and $\Delta s3$ a moving distance of said third lens unit during the focusing.

38. The lens system according to Claim 36, which

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satisfies the following conditions:

$0.40 < f1/f < 0.70,$

$-0.45 < f2/f < -0.25,$

$0.25 < f3/f < 0.55,$ and

$-1.0 < f4/f < -0.4,$

where f1 is a focal length of said first lens unit, f2 a focal length of said second lens unit, f3 a focal length of said third lens unit, f4 a focal length of said fourth lens unit, and f a focal length of the entire lens system.

39. The lens system according to Claim 36, wherein said first lens unit comprises a positive lens closest to the object.

40. The lens system according to Claim 36, wherein a stop is placed between said second lens unit and said third lens unit and said stop is fixed during the focusing.

41. The lens system according to Claim 36, which comprises a flare cut stop in the optical path.

42. The lens system according to Claim 36, wherein said second lens unit and said third lens unit both comprise their respective cemented lenses.

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43. The lens system according to Claim 36, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +... + Ci*h2i)$,

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height from the optical axis,

the following conditions are satisfied:

$C1 < 0$ and $C2 > 0$.

44. A lens system comprising;

a diffractive surface, and

a first lens unit of a positive refracting power, a second lens unit of a negative refracting power, a third lens unit of a positive refracting power, and a fourth lens unit of a positive refracting power in the order (named) from the object side,

wherein during focusing from an object at infinity to an object at a near distance, the first lens unit is fixed, said second lens unit moves toward an image side, and said third lens unit moves toward the object side.

45. The lens system according to Claim 44, which

satisfies the following condition:

$$0.50 < \Delta s2/|\Delta s3| < 4.00,$$

where $\Delta s2$ is a moving distance of said second lens unit during the focusing and $\Delta s3$ a moving distance of said third lens unit during the focusing.

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46. The lens system according to Claim 44, which satisfies the following conditions:

$$0.20 < f1/f < 0.60,$$

$$-0.50 < f2/f < -0.10,$$

$$0.50 < f3/f < 1.50, \text{ and}$$

$$0.70 < f4/f < 1.80,$$

where f1 is a focal length of said first lens unit, f2 a focal length of said second lens unit, f3 a focal length of said third lens unit, f4 a focal length of said fourth lens unit, and f a focal length of the entire lens system.

47. The lens system according to Claim 44, wherein said diffractive surface consists of a diffraction grating rotationally symmetric with respect to the optical axis,

wherein when the phase $\phi(h)$ of said diffraction grating is given by the following equation:

$$\phi(h) = 2\pi/\lambda*(C1*h2 + C2*h4 + C3*h6 +... + Ci*h2i),$$

where λ is an arbitrary wavelength in the visible region, Ci aspheric phase coefficients, and h a height

from the optical axis,

the following conditions are satisfied:

C1 < 0 and C2 > 0.

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48. The lens system according to Claim 44, wherein during the focusing, said fourth lens unit is fixed relative to the image plane.

49. The lens system according to Claim 44, which comprises a stop in the optical path, wherein said stop is fixed during the focusing.

50. The lens system according to Claim 44, which comprises a flare cut stop in the optical path.

51. An optical device comprising;
the lens system of Claim 1, and
a housing which holds said lens system.

52. An optical device comprising;
the lens system of Claim 5, and
a housing which holds said lens system.

53. An optical device comprising;
the lens system of Claim 10, and
a housing which holds said lens system.

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54. An optical device comprising;
the lens system of Claim 18, and
a housing which holds said lens system.

55. An optical device comprising;
the lens system of Claim 23, and
a housing which holds said lens system.

56. An optical device comprising;
the lens system of Claim 28, and
a housing which holds said lens system.

57. An optical device comprising;
the lens system of Claim 36, and
a housing which holds said lens system.

58. An optical device comprising;
the lens system of Claim 44, and
a housing which holds said lens system.